ENVIRONMENTAL CHARGES IN POLAND

Glen D. Anderson and Boguslaw Fiedor

Environment Discussion Paper No. 16
January 1997

C4EP PROJECT
Central and Eastern Europe Environmental Economics and Policy Project

This paper was sponsored by the Harvard Institute for International Development (HIID) under a cooperative agreement with the United States Agency for International Development (USAID).

Glen Anderson is a former HIID Senior Environmental Policy Advisor in Poland and currently works as an HIID consultant for projects in Central and Eastern Europe. Boguslaw Fiedor is a member of the HIID Policy Analysis Working Group in Poland and a faculty member at the Wroclaw Academy of Economics.

For additional information please contact: International Environment Program, Harvard Institute for International Development, One Eliot Street, Cambridge, MA 02138.

Tel: (617) 495-5176. Fax: (617) 496-8040.

1. INTRODUCTION

Since the 1970s, Poland has utilized a system of environmental and resource charges or fines as part of its environmental management system. However, only in the last five years have charges and fines made more than a nominal contribution to the promotion of environmental goals. The primary policy instrument for achieving environmental objectives is the national system of facility permits for point sources of pollution emissions and discharges. All point sources of pollution are required to apply for and maintain pollution permits. These permits specify the allowable discharges of every regulated pollutant from every pipe, stack or other type of conveyance. In principle, local environmental authorities set allowable emission and discharge levels for each source in order to protect ambient air and water quality levels.

Historically, both charges and fines have been closely linked to the facility permit. In the past, charges were levied on the allowable emission or discharge level specified in the facility permit instead of actual levels. The charge was determined by multiplying the allowable emission level or concentration for waste water by the appropriate charge rate. In the last few years, charges have been based on actual rather than allowable emission or discharge levels. The change in approach can be attributed to the dramatic increase in charge rates, wherein polluters whose pollution levels are below allowable levels have a clear incentive to base their charges on actual levels. Specific charge rates have been developed for a variety of air pollutants, solid and hazardous wastes, discharges of waste water, including saline mining waters, surface and ground water extraction, and land clearing. Fines can be issued if the regulated firm discharges or emits pollution in excess of the levels specified in the facility permit. Generally, the fine is equal to the difference between actual pollutant levels and permitted levels multiplied by the fine rate, which is simply a multiple of the charge rate (up to 10 times for air pollutants).

Until the end of the communist regime, charge rates were quite low and did not have a discernible effect on pollution levels or generate much revenue. Since 1990, the charge rates have been increased dramatically to approximately 18-20 times their levels during the communist regime and now are among the highest anywhere in the world. Revenues from charges and fines are distributed to the National Fund for Environmental Protection and Water Management, 49 regional (Voivod) environmental funds, and approximately 2,400 local (Gmina) funds. These funds, in turn, disburse charge and fine revenues for environmental investments and other environmental activities (e.g. education, research, monitoring equipment) through a variety of disbursement mechanisms ("soft" or subsidized loans, grants, and interest subsidies on commercial loans). Approximately 450 to 500 million USD are collected annually from environmental charges and fines, enabling environmental funds at all levels to account for nearly one-half of annual capital costs of environmental investments in Poland.

Thus, the system of environmental charges and fines is an integral and important component of environmental management in Poland that complements direct regulation through permitting, provides modest incentives for reducing pollution, and makes a major contribution to the financing of environmental improvements. Of less importance than

charges, fines, and direct regulation in Poland's environmental policy, are other economic instruments such as differentiated taxes and duties on imported goods. These taxes often include provisions for lower rates on environmentally-friendly goods. For example, the excise tax on unleaded gasoline is lower than for leaded gasoline, resulting in lower retail prices for unleaded gasoline despite its higher production costs. Also, a significantly lower value added tax (VAT) of 7% – as oppossed to the usual VAT rate of 22% – is assessed for some environmental protection items. Finally, there are an assortment of minor investment tax credits and tax deductions for charitable contributions of an environmental nature.

The purpose of this paper is to describe the system of charges, fines, and permits in Poland, analyze the implementation experience to date, and identify potential or needed improvements. The next section provides a more detailed description of the respective charge, fine, and permit systems and highlights key features of each. Section 3 focuses on practical aspects of implementation, while Section 4 provides an evaluation of these environmental systems. In the concluding section, some recommendations for improving the system of charges, fines, and permitting are presented.

2. THE STRUCTURE OF THE SYSTEM OF ENVIRONMENTAL CHARGES AND PERMITS

2.1. Environmental Charges

The provisions for imposing environmental charges are contained in the Environmental Protection Law (EPL) of 1980, the Water Law of 1974, and amendments to each of these laws. Both acts include declarations to the effect that the economic use or modification of the natural environment provides the basic motivation for assessing charges. Thus, both the *User Pays Principle* and the *Polluter Pays Principle* would seem to provide a rationale for charges. Both the EPL and the Water Law restrict the use of revenues from charges to ecological purposes and require disbursement through environmental funds.

A broader statement of the role and purpose of environmental charges is outlined in the National Environmental Policy of Poland, approved by the Council of Ministers in 1990 and the Polish Parliament in 1991. It is the stated intent of the government that charges should serve a complementary role in the national administrative/regulatory system of environmental management. The first objective of charges is to encourage polluters to minimize the social costs of meeting environmental goals. Thus, to meet this objective, charge rates must be high enough to encourage polluters to invest in control rather than to simply pay the charge. In addition, the charges should bear some relation to the marginal damages resulting from pollution emissions or discharges. The third objective of charges is to generate revenues which can then be recirculated for environmental investments and related purposes (e.g., education, research, monitoring equipment). Environmental charges are also viewed as an integral part of Poland's commitment to the *Polluter Pays Principle* and are expected to contribute to the fulfillment of Poland's short, medium, and long term environmental priorities enumerated in the National Environmental Policy.

As noted earlier, charges are assessed for a variety of environment and natural resource

uses. The procedure for promulgating environmental charges begins in the Ministry of Environmental Protection, Natural Resources, and Forestry (MEPNR&F), where staff prepare the list of pollutants for which charges are to be assessed and develop proposed charge rates. The proposed charges and rates are submitted to the Council of Ministers for approval. Generally, charge rates are revised annually. Since 1992, the year when charge rates were raised to their highest real rates, annual revisions to the charge rates have been motivated by the desire to maintain the real – as opposed to nominal – rate structure of the charges, although there have been some minor revisions in specific charges as well. Slippage in charge rates due to inflation is largely avoided by adjusting nominal charge rates to account for projected inflation in the next year. If actual inflation deviates significantly in either direction from projected inflation, adjustments can be made in the following year.

For all charges assessed on emissions or discharges, the Ministry of Environmental Protection has attempted to group pollutants according to potential damage to human health and the environment. Generally, *relative* differences in rates are correlated with differences in pollutants' toxicities or potential to cause environmental damage. For example, solid and hazardous wastes are grouped into four categories according to the toxicity of the wastes. In addition, air emissions of heavy metals and suspected carcinogenic pollutants such as benzene are assigned extremely high rates. The *absolute* magnitudes of the rates are not set to reflect marginal damages to health and the environment or to correspond with the marginal costs of abatement. Factors such as damages, abatement costs, and economic characteristics of the polluting sector are taken into consideration, but ultimately the rates are set at levels that are politically acceptable and meet revenue requirements.

There are two other types of charge rate differentiation. First, charges for surface and ground water extraction are differentiated by geographical region. Poland has many regions with chronic water supply shortages. Thus, these charges vary according to the scarcity of water supplies. Charge rates also vary according to the type of use (for surface and ground water extraction and waste water discharges). For example, the waste water charge for biological oxygen demand (BOD_5) is ten times higher for power generation than for municipal sewage.

The types of environmental charges and the amount charged are described in the Appendix, which is based on Directives 637 and 772 of the Council of Ministers, issued December 27, 1993 and December 28, 1994, respectively. In brief, air pollution charges have been developed for 62 specific air pollutants and similar or related compounds plus seven types of evaporative air emissions. For the eight most toxic air pollutants (acrylonitrile, arsenic, asbestos, benzene, benzo-a-pyrene, polychlorovinyl, chromium, and nickel), environmental charges are 123.6 PLN (new Polish zlotys) per kilogram or about 53,739 USD per ton. Charges for common air pollutants such as SO_2 and NO_x are 82 USD per ton (See Table A.1 in the Appendix). Charges are also levied on 163 types of solid wastes divided into four categories on the basis of toxicity. The charge for the four categories from most to least toxic wastes are 21.49 USD per ton, 8.06 USD per ton, 2.69 USD per ton, and 1.61 USD per ton, respectively (see Table A.2 in the Appendix). Charges for waste water are related to concentration levels for BOD_5, chemical oxygen demand, suspended solids, chlorate and sulfate ions, heavy metals, and volatile phenols (see Table A.3 in the

Appendix).

Environmental charges normally are collected once a year by the regional (Voivod) environmental protection departments. As a result of a 1990 amendment to the EPL, the Governor of the Voivod may request that large enterprises pay their charges in quarterly installments. Enterprises are able treat environmental charges as normal business expenses and to deduct the amount of charges paid from taxable income. Thus, charges are treated as a normal production cost. An interesting provision allows enterprises to deduct the amount of the charges *levied* in the current year from the current year taxable income even if the enterprise does not actually *pay* the charges until the next calendar year.

Once charges (and non-compliance penalties) are collected, they are distributed to the National, Voivod, and Gmina environmental funds. Three alternative distribution schemes are used to allocate revenues to the three types of funds. Most charges and fines for air pollution, water extractions, and waste water discharges are distributed according to the first distribution scheme (Table 2.1). These air and water charges and fines represent the largest share of revenues. As a result, the overall shares of total revenues distributed to the National, Voivod and Gmina funds is almost identical to the share allocations for the first distribution scheme. The bulk of charges and fines for nitrogen oxides and saline mining waste water discharges are distributed to the National Fund, while the greatest share of hazardous and solid waste charges and fines are distributed to local and voivod funds. The impetus for distributing a large proportion of the revenues for nitrogen oxides to the National Fund relates to the desire to encourage cost-effective improvements throughout the country (since nitrogen oxides are a regional and trans-boundary pollutant). Most revenues from saline mining water charges and fines go to the National Fund to provide flexibility for financing investments in controls at mines, as well as treatment in downstream river basins. Similarly, the distribution scheme for solid and hazardous waste charges and fines reflects the local nature of disposal and impacts.

All charges and fines distributed to the National and Voivod funds must be *earmarked* for investments and other expenditures to reduce the general types of pollution from which the revenues were collected. Thus, waste water charges and fines (excepting saline mining waters) must be dedicated to reducing waste water discharges, but not necessarily to address a specific type of waste water problem (such as suspended solids). Only revenues from nitrogen oxides and mining waste waters must be used for the exclusive purposes of reducing nitrogen oxide emissions and saline mining water discharges, respectively.

2.2. Facility Permits

Under Polish law all economic units are required to apply for permits for water intake and waste water discharges, and emissions of air pollutants. Noise and vibration; disposal of solid waste; and treatment, storage, and disposal of hazardous wastes also require permits. For all types of permits, similar application procedures are followed. The facility must apply for a permit and submit supporting documentation to the Voivod administrative authority. In practice, the Voivod Department of Environmental Protection will review the application and issue the permit. The critical document in the application package is the environmental impact statement which includes information on production levels, types of

production processes utilized by the facility, fuels used, types and volumes of emissions or discharges that result from the proposed level of production, and the types of installed pollution controls. The applicant must also select an independent expert from an approved list compiled by the Ministry of Environmental Protection to review the documentation and make a recommendation to the Voivod.

Table 2.1 Distribution of environmental charges and fines

Three Distribution Schemes		
1.	**Charges and non-compliance fines on air emissions (except NO_x); charges for surface and ground water extractions; waste water charges and non-compliance fines:**	
	National Environmental Fund	**36%**
	Voivodship Environmental Funds	**54%**
	Gmina Environmental Funds	**10%**
2.	**Charges and non-compliance fines on NO_x; charges and non-compliance fines on saline mining waste water discharges:**	
	National Environmental Fund	**90%**
	Gmina Environmental Funds	**10%**
3.	**Charges and non-compliance fines on solid and hazardous waste disposal:**	
	National Environmental Fund	**20%**
	Voivodship Environmental Funds	**30%**
	Gmina Environmental Funds	**50%**

Source: Spyrka, J. 1994

Upon submission of the documentation and the independent expert's report, the Voivod will make a determination of permitted emission or discharge levels. In the case of noise, a maximum noise level will be specified in the permit. In addition to the documentation submitted by the applicant, the Voivod is supposed to take into consideration current ambient pollution concentrations and determine the level of allowable pollution which will not result in degradation of ambient quality levels. In principle, permits may not be issued if the facility's proposed emissions would lead to violations of ambient standards. Voivod authorities may issue temporary permits if the facility submits a plan for implementing controls that would allow the facility to attain the allowable pollution levels. There is a strong incentive for facilities to obtain a temporary permit rather than to operate without a permit, since charges and fines (based on the proposed allowable level) are doubled for any pollutants not covered by a valid permit. New permits may also be denied if ambient standards are exceeded.

Pursuant to the EPL and the 1990 Ordinance of the Minister of EPNR&F, the Voivod is responsible for meeting the national ambient air quality standards, as specified by the

Minister in Attachment 1 to this Ordinance. For air emissions, the permit applicant is also required to conduct air dispersion modeling to determine the contribution of facility emissions to ambient air quality. These findings also have to be approved by an independent expert. In its decision to issue the permit, the Voivod will attach considerable importance to the finding of the air dispersion modeling on the extent to which applicants' emissions contribute to violations of ambient standards.

An important exception to the practice of setting allowable levels to protect ambient environmental quality is the treatment of combustion sources. The February 12, 1990 Ordinance of the Minister of Environmental Protection, Natural Resources, and Forestry on Air Protection introduced special, technology-based emission standards for SO_2, NO_x, and particulates for major combustion sources with capacities greater than 200 kilowatts. All of these large combustion sources must comply with the technology standards by January 1, 1998.

Facility permits for water intake and discharge are separate but interrelated. They are issued together, but the permit for waste water discharges requires an environmental impact statement, as required for air pollution permits. According to the Water Law, the waste water discharge permit is required by all enterprises, and industrial and municipal sewage treatment plants who discharge sewage into surface waters or soils.

The applicant must submit a detailed environmental impact statement approved by an independent reviewer. The statement should include an enumeration of the types of water effluents disposed, their quantities, and pollutant loads (concentrations of BOD, suspended solids, and other pollutants). The permit specifies the allowable amount of the sewage that can be disposed, highest concentration of particular pollutants, and other technical features of sewage (e.g. the radioactivity or temperature). Similar to air pollution permits, the Voivod takes into consideration the influence of applicants' waste waters on the quality of surface waters. A general point of reference for surface water quality is the classification system defined in the November 5, 1991 ordinance of the Minister of EPNR&F. For waste water discharge permits, the Voivod Environmental Protection Department will issue the permit with the concurrence of the Voivod Sanitary Inspectorate.

2.3. Enforcement and Non-Compliance Sanctions

Under Polish law, the State Inspectorate for Environmental Protection has the lead responsibility for enforcement of permits. Inspectorate offices have been established in each of the 49 Voivods in Poland. While the Voivod Environmental Protection Department is responsible for issuing permits, the Inspectorate conducts facility inspections. The Inspectorate determines the extent of permit violations, levies non-compliance penalties, approves requests for deferral of penalties, and monitors enterprises' progress in addressing violations.

Non-compliance penalties are levied on the quantity of emissions or discharges in excess of the allowable limit specified in the facility permit. Penalty rates can be as high as 10 times the charge rate. For waste water, permits are specified in terms of pollutant concentrations in waste water. A more complicated formula is used to determine the level of waste water

penalties. Nevertheless, penalties for waste water are generally two to five times the applicable charge rate. Under Polish law, the *penalty rate* is fixed and cannot be reduced through negotiation between the enterprise and the State Inspectorate. However, the *degree* of the violation may be subject to negotiation. Continuous monitoring of emissions or discharges is not required. Thus, the extent of the violation must be estimated *ex post*, on the basis of the frequency of violations and calculations based on emission factors, level of production, and use of inputs (e.g., tons of coal burned by the enterprise).

For tax purposes, non-compliance penalties are treated differently than charges. Enterprises are not allowed to deduct non-compliance penalties as production expenses. Whereas a portion of the charge burden is shifted to other taxpayers, enterprises bear the full cost of penalties. Provisions have been made in the system of non-compliance penalties for penalized enterprises to defer the payment of penalties for 3-5 years. To qualify for this deferral, enterprises must implement measures to attain compliance status. If the enterprise is successful in attaining compliance, all or a portion of the deferred penalties may be forgiven, depending on the level of expenditures the enterprise makes to attain compliance. If these investments exceed the amount of accumulated penalties, the entire penalty is canceled. If the enterprise fails to attain compliance, a 50% surcharge of the original amount of the penalty is assessed and the deferred penalty plus the surcharge is collected. The Inspectorate can require the immediate payment of deferred fines if an enterprise fails to take actions (identifying technical options, applying for assistance, making investments) that would lead to compliance. In practice, however, regional inspectorates will not require payment of deferred charges until the deferral period ends, even if a polluter makes no effort to correct the violation (Warsaw Voivod Inspectorate, 1996). The Inspectorate is also empowered to shut down enterprises (or processes within facilities) which are chronically in violation of the terms of their permits or are operating without valid permits.

At the very beginning of the transformation process in Poland, the Ministry of Environmental Protection, Natural Resources, and Forestry created the "List of 80" worst polluters in Poland. The selection of enterprises for inclusion on the List of 80 was based on criteria including, *inter alia*, frequency of pollution discharges in excess of environmental standards, the degree of concentration of discharges, the location of enterprises, and the range of negative impacts. The State Inspectorate prepared performance criteria for enterprises on the List of 80 related to reduction of the quantities of pollutants discharged by all of these enterprises and required listed enterprises to prepare implementation programs describing the actions to be taken (e.g., technological changes, restructuring of production process, construction and modernization of environmental controls), which would enable them to meet the established requirements. April 1993 was the date by which enterprises were expected to meet the performance criteria.

Approximately 800 enterprises, in addition to those on the List of 80, were also targeted as major polluters and subjected to special management supervision by the Voivod offices of the State Inspectorate. These enterprises were required to prepare environmental audits and develop compliance strategies.

An appeals procedure was also established to allow enterprises to contest penalties, suspension of deferred penalties, or orders to terminate facility operations. Enterprises may

appeal such decisions to the Minister of Environmental Protection, Natural Resources, and Forestry. Generally, if enterprises provide concrete proposals for addressing their non-compliance problems, they are successful in appealing orders to close down.

3. IMPLEMENTATION EXPERIENCE

To examine Poland's experiences in implementing its system of permitting, charges, and fines, four topics will be discussed: (1) collection rates and rate calculations for charges and fines; (2) coverage of the system of facility permits; (3) capacity to monitor compliance and self-reported emission and discharge levels; and (4) success in eliminating non-compliance.

3.1. Collection Rates and Rate Calculations for Charges and Fines

As noted previously, Poland has increased charge and fine rates significantly in the 1990s compared to their levels in the 1980s, with most rates increasing 18-20 times in real terms. Prior to the large increase in charge rates, local authorities were able to collect nearly all of the charges and fines levied (see Table 3.1). Thus in 1990, 96.8% of charges and fines levied were collected by voivod authorities. In 1991, rates increased dramatically, leading to an increase in the amount of charges and fines levied from $31.1 million in 1990 to $523.1 million. However, authorities were only able to collect 73.7% of imposed charges and fines. In 1992 and 1993 collection rates continued to decline as the total amount of charges and fines imposed increased. Data for 1994 indicate that collection rates declined slightly to 64.7% from their 1993 level.

Table 3.1 Environmental Charges and Fines (in millions of US$)

	1990	1991	1992	1993
Imposed charges and fines:	**31.1**	**523.1**	**649.6**	**660.6**
Amounts actually collected:	**30.1**	**385.7**	**446.8**	**428.5**
Collection efficiency rate:	**96.8%**	**73.7%**	**68.8%**	**64.9%**

Source: Kruszewski, J. 1994

Table 3.2 provides data on charge and fine collections in 1994. As can be seen in the table, environmental charges represent the largest share of revenues (88.9%), while charges from mineral extraction and fines are relatively minor sources of revenue. There are some striking differences between collection rates for charges. Collection rates for water withdrawals and air pollution are 96% and 90%, respectively, while charges for waste

disposal, waste water, and tree cutting are much lower. Because of the manner in which mineral extraction charges are collected, there is no assessment of the charge prior to collection. Fine collection rates are only 13%, significantly lower in comparison to regular charges. However, the collection rate for fines is difficult to interpret because of provisions for deferral of penalties for 3 to 5 years. Most of the uncollected fines are deferred and subsequently subtracted from investment costs incurred to achieve compliance. It should also be noted that charge payments for a given year include revenues for charges imposed during the current year plus revenues for delinquent payments from previous years. Thus, year-to-year fluctuations in collection rates may be attributed partly to the payment of delinquent charges and unpaid charges in the current year.

As noted earlier, the level of charges imposed is based on self-reported emission and discharge amounts. The ability of regional inspectorates to verify these amounts is limited by staff resources and compounded by the large number of facilities and individual pollutants that must be checked. In addition, there appear to be a number of small and medium-sized enterprises that have not been included in the charge system. Similar problems have been noted earlier for fines. Thus, it appears that potential charges and fines are probably higher than levels reported.

Table 3.2 Environmental Charge and Fine Revenues in 1994

Type of Charge	Charges Assessed (Mill. USD)	Charges Collected (Mill. USD)	Collection Rate
Environmental Charges:	**585.9**	**431.6**	**74%**
Water Withdrawals:	**56.9**	**54.6**	**96%**
Waste Water Discharges:	**200.9**	**91.3**	**45%**
Air Pollution:	**245.8**	**222.0**	**90%**
Waste Disposal:	**81.9**	**63.5**	**77%**
Tree Cutting:	**0.2**	**0.1**	**47%**
Non-Compliance Fines	**101.4**	**13.5**	**13%**
Mineral Extraction Charges:	**n.a.**	**41.2**	**n.a.**

Source: NFOSiGW, 1995

While some effort has been made in Poland to relate charge and fine rates to environmental damages and/or compliance costs, there is no transparent methodology applied at the present time. Generally, there is better justification for differentiated rates based on relative toxicity than for the absolute levels of charges. However, there are still some major flaws in rates for different users, particularly for water and waste water. For example, charges for use of surface and ground water are as much as 31 and 47 times higher for certain classes of industrial users than for households, municipalities, and agricultural interests (Zylicz, 1994). Similar distortions are observed for charges on waste water discharges, although the spread is more on the order of 10 times. Currently, a number of environmental economists and environmentalists are recommending that waste water discharge rates be differentiated according to the quality of watercourses into which a facility discharges its effluent.

3.2. Coverage of the System of Facility Permits

Most of the larger facilities in Poland operate under either a valid permit or a temporary

permit. In 1992, 17,389 facilities were registered as water polluters and 46,305 as air polluters (Broniewicz et al., 1994, p. 3). Although registered facilities are required to apply for facility permits, it is estimated that nearly half of facilities operate without valid permits (Broniewicz et al., 1994, pp. 5-6). The backlog is largely attributable to limited local resources to process permit applications. In addition, there is growing concern about the permitting requirements resulting from Poland's harmonization with environmental directives of the European Union. In many instances, current facility permits will need to be revised. When added to the resource and staff costs to prepare permits for those facilities which currently have no permits, local environmental authorities will face an enormous challenge.

The difficulty of updating and preparing new permits could also be affected by additional factors. First, some fine tuning of national ambient standards might require revisions of airshed modeling and modification of allowable emission and discharge levels. Second, as the State Inspectorate proceeds with plans to improve the system of ambient monitoring, new data may also raise some questions about the quality of airshed monitoring and the ability of voivods to meet ambient standards. Third, assuming the new Water Law is enacted, there will be a shift in responsibility for protecting the quality of Poland's ground and surface waters from the voivods to seven regional water authorities. This could lead to much greater consideration of upstream loading and downstream water quality than under current voivod management.

Finally, there is a need to upgrade the skills of environmental officials and staff at the regional and local levels. The terms of the permits given by different regional administration bodies differ fairly significantly. These disparities cannot be attributed only to differences in climatic and topographical features, but also to considerable differences in professional skills and experience of environmental inspectors and other civil servants being employed in the environmental protection departments.

3.3. Capacity to Monitor Compliance and Verify Pollution Levels

The Law on the State Inspectorate for Environmental Protection of July 20, 1991 provided the basis for Poland's monitoring system. Polish authorities began to develop the extensive environmental monitoring network for air, noise, surface and ground waters, nature protection, and radioactive contamination in 1992. The system is expected to be completed by 1997. Once the monitoring system is fully operational, it is anticipated that new monitoring data will play a greater role in the development of environmental policy and provide a basis to revise ambient quality standards. In addition to the development of this extensive monitoring network, regional inspectorates have been created with responsibilities for monitoring compliance with facility permits and for verifying the accuracy of pollution levels reported by facilities (for calculation of charges).

The efforts of voivod inspectorates to carry out these functions are hampered by a number of factors. First, there is no explicit requirement for permitted facilities to undertake an ongoing monitoring program and to invest in on-site monitoring equipment. This means that the historical record must be reconstructed from other related and known data, such as production levels, processes, and technologies. Second, voivods lack the staff resources to

conduct frequent inspections of facilities to verify compliance with permit requirements and calculate pollutant levels. Third, because fines are significantly higher than charges, there are greater incentives to avoid fines. Non-complying firms can contest the extent of violations of permit terms (assuming they are detected at all). In addition, once a fine is issued, firms can request deferrals of fines while they attempt to implement investment projects to correct violations. While the deferral policy most often leads to elimination of violations, it nevertheless increases the workload of the regional inspectorates; monitoring of a polluter's plan to correct a permit violation is undertaken by the regional inspectorate. The added penalty for failing to comply after requesting deferral is only a one-time charge of 50%. For a three to five year deferral this is a small charge when one considers that recent inflation rates have been 25-35% per year.

3.4. Success in Eliminating Non-Compliance

The major policy initiatives undertaken in Poland to achieve compliance with environmental regulations have been noted earlier and include charges, fines, subsidized financing available from the National and voivod environmental funds, and targeted non-compliance monitoring of enterprises on the List of 80. It is difficult to examine the effect that charges have on compliance decisions, independent of the subsidized financing. As will be discussed in greater detail in Section 4, charge rates are not high enough to provide incentives for investments. However, payment of charges generates substantial revenues, which are recirculated as grants and soft loans to enable enterprises to finance environmental investments. These recirculated revenues provide almost half of the funds for environmental investment in Poland. Non-compliance fine rates are quite significant and clearly have an impact on violators. A large proportion of violators request deferral of fines, thereby committing themselves to programs of investments. According to the OECD, approximately 70% of violators are now in compliance with permit requirements (OECD, 1995, p.100).

The "List of 80" and similar Voivodship lists, which are based on the same concept and include almost 800 enterprises, have existed for almost five years. Seven enterprises from the List of 80 have been permanently closed and production at another 22 facilities was at least partially or temporarily interrupted. The preparation of the list has helped central and local administrations focus their attentions on the environmental hot spots in Poland and stimulated communities in the neighborhoods of listed enterprises to take an interest in solving environmental problems. The actions of enterprises under public pressure and scrutiny have brought considerable reductions of pollutants emitted by enterprises on the "List of 80". According to a report of the State Environmental Inspectorate conducted in 1993, the following environmental improvements have been made by listed enterprises (relative to 1989 levels): (1) emissions of particulate matter decreased by about 67%; (2) emissions of gases decreased by about 44%; (3) discharged sewage decreased by about 37%; and (4) stored waste decreased by about 42%.

At least a portion of these reductions is attributable to the decrease in economic output of these enterprises during 1990-1993, but the majority of these reductions are generally attributed to actions taken by enterprises to reduce emissions. In May 1994, several enterprises from the "List of 80" were removed and a few new ones were listed. At present,

74 enterprises are on the list. The State Environmental Inspectorate projects that six more enterprises may be removed from the list by the end of 1995 and an additional ten enterprises by the end of 1996.

4. THE STRUCTURE OF INCENTIVES IN THE POLISH SYSTEM OF ENVIRONMENTAL CHARGES AND PERMITS

There is considerable support among economists for the use of charges to provide incentives for polluters to make decisions on investments in pollution control. Presumably, polluters will undertake those investments for which the marginal cost of control is less than the charge rate. This shifts the burden of achieving environmental goals to the policy maker, who must establish charge rates at levels that will encourage polluters to make reductions sufficient to meet environmental targets. If rates are set too low, too many polluters will prefer to pay the charges rather than invest in controls. If the rates are two high, assuming environmental agencies are able to collect the high charges, polluters will *over control*.

Environmental charges in Poland are among the highest in the world. Yet even at these levels, charges are not high enough to stimulate polluters to make investments adequate to meet emission or discharge targets. For example, the charge on SO_2 is approximately $75 per ton. However, the estimated marginal cost of investments to achieve a 30% reduction (equivalent to the new requirements that take effect in 1998) in SO_2, using the RAINS (Regional Acidification Information and Simulation) model developed by the International Institute for Applied Science Analysis, is approximately $600 per ton for large combustion sources. There is at least some anecdotal evidence that the high charge rates have provided incentives for polluters to make low cost improvements to reduce emissions of particulates and sulfur dioxide, although not necessarily sufficient to generate compliance with the standards.

Overall, the system of charges plays a secondary role in providing incentives for pollution reduction. Charges are high enough in Poland to encourage facilities to make low cost and win-win investments or to make improvements in "housekeeping" practices. Charges generally do not encourage polluters to exceed permit requirements by a substantial amount. Thus, where stricter standards are phased in (e.g. the 1998 major source combustion standards), charges rates are not high enough to encourage early or accelerated compliance. More traditional enforcement measures, including non-compliance fines and legal authority to close down a chronic violator, provide incentives for meeting current requirements.

It might be possible to increase charge rates above their present level to provide greater incentives for pollution control measures, but there does not appear to be political support to increase charge rates. Even if charge rates were increased, there is considerable concern among economists in Poland that enterprises lack the expertise to evaluate abatement costs and determine least cost solutions to minimize the sum of charge payments and abatement costs. While capital costs of environmental investments are known, enterprises have limited experience in estimating depreciation or "running" costs (O & M). This limited experience can be partly attributed to the Polish Law on Accounting, which does not require

enterprises to create separate accounts for environmental protection. In addition, official statistics only cover capital expenditures on environmental investment. Furthermore, environmental protection expenditures are defined *sensu stricto* as end-of-pipe, stack and waste disposal investments and do not include investments in energy and resource efficiency, production process improvements, or waste minimization. Even if charge rates were higher, it is therefore not clear that enterprises would be able to respond to these "price signals" and implement least cost solutions.

Charges and fines generate over $400 million per year and these revenues are recirculated by the environmental funds for environmental investments and other environmental activities. All new revenues from charges and fines are earmarked for expenditures to address the types of pollution from which the charges were generated. The standard concern with earmarking is that these revenues do not necessarily achieve the greatest net social benefits. The most efficient method of distributing charge revenues would be to allocate them to projects generating the greatest net social benefits, whether for air, water or waste. For sulfur dioxide and nitrogen oxide, the recirculation distortion is somewhat less because the charges, while earmarked for reducing these pollutants, can be distributed for abatement projects in any region and any enterprise. For example, charges collected from a power plant do not have to be spent on expensive end-of-pipe treatment, but may be used to co-finance a coal-washing project elsewhere in Poland.

Much more severe distortions in the efficient use of charge revenues are caused by the fact that on balance Poland's environmental funds have transferred resources from manufacturing industries to municipalities. This practice reinforces and, in the case of charges on water, amplifies the wrong signals sent to the household sector and municipalities. This is yet another example of how equity concerns interfere with the efficiency of the charge mechanism. In addition to these problems, the National Fund and voivod environmental funds have – until recently, and then only for a selected number of funds – employed poor project screening and assessment procedures in evaluating grants and loans. These practices sometimes lead to the selection of projects that are not cost-effective even within their respective category of abatement (such as sulfur removal, municipal waste abatement and so on).

Given the existence of earmarking and the current project selection practices, it is interesting to look more closely at the largest industrial polluters and to speculate whether they are better served by the current system of charges (and recirculated grants and loans), compared to an alternative structure where charges are retained by firms and invested in environmental controls. In a sample of 112 of the largest polluters in Poland, Broniewicz *et al*. estimated the percentage of enterprise expenditures devoted to charge payments, abatement costs, and other pollution costs. For the entire sample, pollution charges in 1992 represented 4.9% of expenditures, abatement costs were 1.6% and other pollution costs were 0.5%. Total expenditures on charges for the surveyed enterprises were $190 million compared to investments of only $108 million.

Interestingly, while environmental funds provided about half of the financing for environmental investments, grants and loans financed by environmental funds only accounted for 16% of investment expenditures among surveyed enterprises. On the surface,

it would seem that these large polluters would be better off if they could retain charge payments, but there may be other explanations for the limited use of grants and loans by surveyed enterprises; investments not identified or applications not prepared for submission to funds, other more pressing non-environmental investments given priority over environmental investments, etc. In addition, to the extent that investment proposals are evaluated by funds using criteria related to cost-effectiveness or net benefits achieved, charge revenues may achieve greater net benefits when invested by Funds than if enterprises are allowed to retain their own charges for investments. Retention of charges would also require an additional level of monitoring by environmental authorities to assure retained charges are actually used for environmental purposes.

5. RECOMMENDATIONS FOR IMPROVING THE SYSTEM OF ENVIRONMENTAL CHARGES

While Poland has established a comprehensive and integrated system of charges, fines, and permitting, there are a small number of problems that, if addressed, would improve the system's performance.

1. Fine-tuning of charge rates

Under the current system there are too many pollutants with separate charges. As noted, it is difficult for local authorities to monitor actual emissions or discharges. There are also concerns about the absolute rates of charges and the relative differences between charge rates for pollutants of varying toxicities. Third, the justification for differential charge rates for different classes of sources is very weak, and removing distortions in charge rates differentiated by toxicity or user would enhance the credibility of the charge system. It has also been suggested that the system of charges be streamlined and simplified to enhance monitoring and collection.

2. Introduction of product charges

When charges severely affect firms' profits, they may respond by under-reporting emissions or refusing to pay charges rather than investing in abatement or closing-down. Social problems during the transition period and barriers to financing of environmental investments may also contribute to evasion of charges. The experience of OECD countries suggests that product charges may be a more effective revenue-raising instrument than pollution charges. Fuel charges were first proposed by the MEPNR&F in Poland in 1990, but did not garner adequate support in the Council of Ministers for consideration by Parliament. Currently, the Ministry of Environmental Protection is preparing a proposal for new product and deposit-refund charges. The proposal is still at the conceptual level, but if it receives the support of Parliament's Environmental Commission, it may be submitted for legislative consideration in 1996. Revenues from product charges would go to the National Fund, allowing some re-allocation of charge revenues from the National Fund to voivod and gmina funds.

3. Clarify responsibilities for meeting ambient quality standards

At the current time, there is often ambiguity and overlapping authority for meeting ambient quality standards. Much of the problem stems from conflicts over jurisdiction between voivods, municipalities, and gminas. Permits are issued by the voivod, but municipalities play a role in developing environmental master plans for their communities and receive a portion of charge and fine revenues from gmina funds. Poland is now developing a new organic or framework environmental law. This development provides an opportunity to clarify responsibilities for meeting environmental quality standards among different levels of government.

The situation for water pollution is particularly unclear. Poland is in the process of creating seven regional water districts delineated according to the major river basins in the country. However, the new water law, which would transfer authority from voivods to these regional districts, is not expected to be enacted until the issue of how to distribute water and waste water charges is resolved to the satisfaction of voivods. If all of these charges are given to the new regional water funds, voivod funds would lose almost half of their current working capital. From an efficiency perspective, regional water funds would be best able to promote environmental improvements in the river basins. However, voivods would lose control of resources for local waste water projects (unless they received support from regional water districts).

4. Increased flexibility in permits

At the current time, facility permits do not accommodate the use of economic instruments such as offsets, bubbles, or emissions trading. Permits specify emissions and discharges for each individual process and emission or discharge source. With the exception of the new major source combustion standards, facilities are not allowed to average across sources. Some recent work on air pollution suggests there may be substantial benefits from the use of these economic instruments. In the voivod of Opole, a pilot emissions trading program in SO_2 is being developed. However, changes in Polish permitting laws will be required to implement the pilot program.

REFERENCES

Broniewicz, E., B. Poskrobko, and T. Zylicz (1994), "Internalizing Environmental Impacts of Industry in Poland: Preliminary Empirical Evidence", Paper presented at the 5th Annual Conference of the European Association of Environmental and Resource Economists, Dublin, Ireland.

Kruszewski, J. (1994), "Poland", In *National Environmental Protection Funds in Central and Eastern Europe. Case studies of Bulgaria, the Czech Republic, Hungary, Poland and the Slovak Republic*. Edited by P. Francis. Regional Environmental Center for Central and Eastern Europe, Budapest.

National Fund for Environmental Protection and Water Management (NFOSiGW) (1995), *The Report of the National Fund for the Year 1994*. Warsaw.

Spyrka J. (1994), "Poland. Part B", In *Use of Economic Instruments in Environmental Protection in Central and Eastern Europe. Case Studies of Bulgaria, the Czech Republic, Hungary, Poland, Romania, the Slovak Republic, and Slovenia*. Edited by J. Klarer. Regional Environmental Center for Central and Eastern Europe, Budapest.

Warsaw Voivod Environmental Inspectorate (January 1996), Personal Communication with Director.

Zylicz T. (1994), "Taxation and Environment in Poland", In *Taxation and Environment in European Economies in Transition*. OECD, Paris.

APPENDIX

Table A.1 Charges for Emissions of Atmospheric Pollutants in Poland in 1995

Atmospheric Pollutant	$US/ton
Acrylonitryl (aerosol), Asbestos, Benzene, Benzo-a-pyrene, Chlorinated Vinyl (gaseous)	$53,739.00
Arsenic, Chromium, Nickel (fee rates apply to metal content)	$53,739.00
Bizmuth, Cerium, Tin, Zinc, Cadmium, Cobalt, Manganese, Mercury Molybdenum, Lead (fee rates apply to metal content)	$26,869.00
Chlorofluorocarbon compounds, Carbon Tetrachloride, Dioxin, Halons, Polychlorinated Biphenyls, 1,1,1 tri-Chloroethane	$26,869.00
Heterocyclic compounds	$1,817.39
Nitric, nitrous, and related compounds	$700.00
Amines, Cyclic and Aromatic Alcohols, Organic and Elemental Sulfur	$360.87
Organic acids and related compounds	$291.30
Carbon Bisulfide	$252.17
Particulates (cement, silicate, fertilizer, solvent, carbon-grafite, carbon black), Ketones and Inorganic Acids, Aromatic and Cyclic Aldehydes. Ether, Aliphatic and related Alcohols, Isocyclic compounds, Aromatic and cyclic hydrocarbons, Non-metallic elements, Non-metallic salts, Non-metallic oxides	$213.04
Aliphatic Aldehydes and related compounds	$143.48
Sulfur Dioxide, Nitrogen Oxides	$82.61
Ammonia, HCFCs, other Halons, Particulates (polymers and lignite), Oils	$73.91
Particulates from fuel combustion, all other particulates	$43.48
Carbon Monoxide, Hydrocarbons	$21.74
Carbon Dioxide, Methane (fee per ton)	$0.04
Charges for Evaporative Emissions	
Filling fuel storage tanks with fixed roof	$0.83
Filling fuel storage tanks with floating roof	$0.05
Filling underground and above ground storage tanks	$0.46
Filling train fuel tanks	$0.46
Filling car/truck tanks	$0.35
Filling automobile tanks	$0.51

Table A.2 Waste Disposal Charges in Poland in 1995

Type of Waste	$US/ton
Group I: The most toxic substances, e.g.:	$21.49
- waste with Mercury or its non-organic compounds (except for HgS) with Mercury content of more than 0.005% - waste with Arsenic compounds (except sulfides) content of more than 0.005% - waste with Selenium content of more than 0.005% - used oils and greases - Asbestos waste	
Group II:	$8.06
- waste with Fluorine compounds less than 0.5% - waste with Mercury and its compounds (except for HgS) in concentration 0.005-0.001% - waste with Arsenic or its compounds (except those in Group I) - banned agricultural chemicals - used catalytic converters	
Group III:	$2.69
- waste from the sodium industry - used adsorbents (e.g. activated carbon) - mineral cement-calcium dusts - asbestos and cement-asbestos waste - waste coming from vessels and harbors	
Group IV:	$1.61
- waste resulting from removing sulfur from fumes - sludge after drinking water treatment - waste coming from textile industry - waste coming from mines - paper, glass	

Table A.3 Charges for Waste Water and Saline (Coal-Mining) Water in Poland in 1995 [$/ton]*

	BOD5	COD	SS	C&S	HM	VP
Power generation, fuel processing, chemical, metallurgical, machine, and light industries	1722	1206	74	6	8600	3226
Pulp and paper industries	732	434	74	6	8600	3226
Food industries	430	290	74	6	8600	3226
Municipal sewage, hospitals, and social care institutions	172	96	74	6	8600	226
Other (except saline coal-mining waters)	861	483	74	6	8600	3226
Saline coal-mining waters discharged directly to an aquifer	-	-	-	48	8600	-
Saline coal-mining waters discharged from dosing reservoirs	-	-	-	6	8600	-

* For discharge into lakes and retention reservoirs double rates apply. Charges applied in Katowice region are twice as high as in the table.

BOD5 = Biochemical oxygen demand during the first 5 days
COD = Chemical oxygen demand
SS = Suspended solids
C&S = Chloride and sulfate ions
HM = Heavy metals
VP = Volatile phenols

The total payment is calculated as the maximum charge for BOD5, COD, SS, and C&S; added to the charge for HM and VP, or Max (BOD5, COD, SS, and C&S) + HM + VP